Section 2
Groundwater Monitoring and Sampling Results

This section presents an evaluation of the groundwater monitoring and sampling results for March 2007. The Site-wide annual monitoring event was performed from March 12, 2007 through March 30, 2007 by Tait. All wells planned for monitoring were accessible during this sampling event, with the exception of well XMW-09 and XMW-19, which were locked and not accessible during the March 30, 2007 water level gauging event. Water levels at these two wells were gauged on March 12, 2007.

The December 2006 quarterly WDR groundwater sampling event was completed from December 4, 2006 through December 7, 2006 and included the following 16 wells: IRZB0081, IRZB0095, CMW001, CMW002, CMW026, IRZCMW001, IRZCMW002, IRZCMW003, IRZMW001A, IRZMW001B, IRZMW002A, IRZMW002B, IRZMW003A, IRZMW003B, IRZMW004, and IRZMW005. Groundwater monitoring and sampling results for the December 2006 quarterly sampling event are presented in Tables 4 and 8. Detailed presentation of the data was provided in the Semi-Annual 2006 Discharge Monitoring Report submitted to the LARWQCB (Tait, January 2007).

A limited groundwater sampling event was completed from November 20, 2006 to November 22, 2006. The following six C-Sand wells were gauged and sampled during the November event: MWC015, MWC016, IWC001, IWC002, EWC002, and MWC024. Groundwater monitoring and sampling results for the November 2006 sampling event are presented in Tables 4 and 8.

Water levels were gauged at 12 groundwater monitoring wells on October 18, 2006 as part of a joint gauging event with the Montrose Chemical/Del Amo Superfund Site and the data has been incorporated into Table 4 of this report. The following wells were gauged as part of the Joint Gauging event: DAC-P1, TMW_10, TMW_14, BL-03, CMW02, MWC021, MWB007, MWB020, MWC007, MWC023, MWC016, and WCC_05S.

2.1 Groundwater Elevations

Depth to groundwater was measured relative to the top of the well casing by Tait on March 30, 2007 (except for wells XMW-09 and XMW-19). The reference elevations used to calculate groundwater elevations are included in Table 2. Groundwater elevations were calculated in feet mean sea level (ft. MSL) by subtracting the depth to groundwater in each well from the surveyed top of casing. Tait's groundwater monitoring and sampling procedures and field data forms are included in Appendices A and B, respectively. The well locations are shown in Figure 1. A summary of the groundwater elevations for March 2007 is presented in Table 3. To facilitate comparison between current and previous water level data, a compilation of historical water level data is presented in Table 4 and the hydrographs for the wells monitored are included in Appendix C (Figures C-1 and C-2).

2.1.1 B-Sand

The depth to groundwater ranged from 57.23 to 67.62 feet below ground surface (ft. bgs) which corresponds to groundwater elevations ranging from – 7.85 to -8.71 ft. MSL. A groundwater elevation map for the B-Sand screened wells is presented in Figure 2. The average hydraulic gradient in the B-Sand across the Site is approximately 0.0008. Groundwater flow direction in the B-Sand ranges from south-southeast at areas north of Knox Street to south-southwest at areas south of Knox Street (see Figure 2).

Due to anomalous groundwater elevations at some of the B-Sand wells, the potentiometric surface map for the B-Sand was generated without considering these anomalous groundwater elevation measurements. Additionally, these anomalous groundwater elevations were not included in the range of groundwater elevations and estimated hydraulic gradient that is discussed in this section.

2.1.2 C-Sand

The depth to groundwater ranged from 58.55 to 63.84 ft. bgs which corresponds to groundwater elevations ranging from -6.98 ft. to -8.68 ft. MSL. A groundwater elevation map for the C-Sand screened wells is presented in Figure 3. The average hydraulic gradient in the C-Sand across the Site is approximately 0.0008. Groundwater flow in the C-Sand is to the south-southwest (refer to Figure 3).

As observed with the B-Sand wells, some anomalous groundwater elevations are noted for some of the C-Sand wells. These anomalous groundwater elevations were not used in generating the C-Sand potentiometric surface map and estimating the hydraulic gradient.

2.1.3 Gage Wells

The depth to groundwater ranged from 61.29 to 64.20 ft. bgs, which corresponds to groundwater elevations ranging from -9.24 ft to -9.42 ft. MSL. A groundwater elevation map for the Gage aquifer screened wells is presented in Figure 4. The average hydraulic gradient in the Gage wells across the Site is approximately 0.00058. Groundwater flow in the Gage aquifer is generally to the southeast (refer to Figure 4).

2.2 Field and Natural Attenuation Parameters

Monitored natural attenuation (MNA) parameters, including pH, DO, ORP, EC, and temperature were measured during purging of the groundwater monitoring wells. A summary of the MNA parameters for the March 2007 sampling event is presented in Table 5. Historical MNA parameters are presented in Table 6 for comparison.

Additional field measurements performed in select wells included ferrous iron and hydrogen sulfide, which was also required under the WDR monitoring program). A summary of these field measurements for the March 2007 sampling event is presented in Table 5.

The above-mentioned field parameters are being collected to evaluate bioremediation of groundwater at the Site.

2.3 Groundwater Quality

The concentrations of detected VOCs from samples collected during March 2007 are summarized in Table 7. Table 8 presents the historical VOCs water quality data to aid in the comparison between current and previous water quality data. Concentration versus time graphs for TCE are presented as Figures C-3 through C-5 in Appendix C. Copies of the laboratory data sheets and chain-of-custody documentation are presented in Appendix D.

Tables 9 and 10 present data for various dissolved gases and general minerals, and qPCR analysis, respectively. As discussed in Section 2.2, the above-mentioned field parameters are being collected to evaluate bioremediation of groundwater at the Site.

2.3.1 B-Sand

A total of 41 wells completed in B-Sand were sampled in March 2007. Thirty-one wells were sampled between as part of the annual groundwater monitoring program and 10 wells were sampled in accordance with the General WDR permit, as part of the post-injection monitoring associated with the previously conducted bioremediation in the Former Building 2 area.

The distribution of TCE in the B-Sand wells is shown in Figure 5. TCE was the most prevalent compound found in the B-Sand, both in terms of concentration and the number of wells in which TCE was detected. Specifically, TCE was detected in all of the 41 wells sampled in March 2007 at concentrations ranging from 2.9 micrograms per liter (µg/L) to 16,000 µg/L. The highest concentrations of TCE occurred in wells IRZMW003A and IRZMW001A, located within the Former Building 2 source area. TCE reached an all time high at well IRZMW003A of 24,000 µg/L in September 2005 and has been decreasing since then (refer to Appendix C, Figure C-3). TCE has been increasing at well IRZMW001A since January 2005. Overall, the TCE plume presented in Figure 5 is generally consistent with previous plume maps dating back to 2001 (Haley & Aldrich, 2002).

1,1-Dichloroethene (1,1-DCE) and cis-1,2-Dichloroethene (cis-1,2-DCE) were the second most prevalent compounds and were found in 33 and 34 of the 41 B-Sand wells, respectively. 1,1-DCE was detected at concentrations ranging from 1.2 to 8,400 µg/L. The distribution of 1,1-DCE in the B-Sand is shown in Figure 6. The highest concentration of 1,1-DCE occurred in well WCC_6S located east of the building at the Former Building 1/36 area. Cis-1,2-DCE was detected at concentrations ranging from 1.2 to 3,500 µg/L. The highest concentration of cis-1,2-DCE also occurred in well WCC_6S.

As shown in Table 7, other VOCs with multiple detections include 1,1,-dichloroethane (1,1-DCA), chloroform, toluene, trans-1,2-Dichloroethene, and vinyl chloride.

2.3.2 C-Sand

A total of 22 wells completed in C-Sand were sampled in March 2007. Sixteen wells were sampled as part of the annual groundwater monitoring program and six wells were sampled as part of the WDR monitoring program for Former Building 2.

TCE was the most prevalent compound found in the C-Sand, both in terms of concentration and the frequency of detections. The distribution of TCE in the C-Sand wells is shown in Figure 7. TCE was detected in all 22 wells sampled in March 2007 at concentrations ranging from 1.2 µg/L to 8,000 µg/L. The highest concentration of TCE occurred in well IRZCMW003 located in the central portion of the Former Building 2 area immediately west of the eastern building. TCE concentrations at well IRZCMW003 have exhibited an overall increasing trend since the well was installed in October 2003 (refer to Appendix C, Figure C-4). TCE concentrations in the C-Sand are generally consistent with previous annual event (CDM, 2006) and historical values (Table 8).

1,1-DCE and cis-1,2-DCE were the second most prevalent compounds, each found in 21 of the 22 C-Sand wells. 1,1-DCE was detected at concentrations ranging from 1.2 to 24,000 µg/L. The distribution of 1,1-DCE in the C-Sand is shown in Figure 8. The highest concentration of 1,1-DCE occurred in well EWC001 located east of the building at the Former Building 1/36 area. Cis-1,2-DCE was detected at concentrations ranging from 1.5 to 1,800 µg/L with the highest concentration also detected in well EWC001.

As shown in Table 7, other VOCs with multiple detections include 2-butanone (MEK), 1,1,1-TCA, chloroform, and chlorobenzene.

2.3.3 Gage Wells

A total of four Gage wells were sampled in March 2007 as part of the annual groundwater monitoring program. TCE was detected at concentrations ranging from 2.9 µg/L in well MWG003 to 180 µg/L in monitoring well MWG002.